What is claimed is:

1. A bias control circuit for controlling a bias current of a high-frequency power amplifier, comprising:

a voltage conversion circuit for receiving a control voltage and for converting the control voltage into a bias control voltage to be supplied to the high-frequency power amplifier, said voltage conversion circuit includes:

a two-stage differential amplifier, constituted by two pairs of amplifying transistors and having an inverting input terminal, a non-inverting input terminal, an inverting output terminal and a non-inverting output terminal, for receiving the control voltage at the inverting input terminal and for outputting an inverting output voltage and a non-inverting output voltage from the inverting output terminal and the non-inverting output terminal, respectively;

an output transistor for effecting low impedance conversion for the non-inverting output voltage of the two-stage differential amplifier to obtain an output voltage and for outputting the thus obtained output voltage, as the bias control voltage, to the high-frequency power amplifier;

a feedback circuit for making entire feedback of the output voltage to the non-inverting input terminal of the two-stage differential amplifier and for making feedback of the inverting output voltage of the two-stage differential amplifier to the inverting input terminal thereof; and

a diode-connected biasing transistor for regulating base voltages of the pair of amplifying transistors constituting a first amplifier stage of the two-stage differential amplifier.

2. The bias control circuit according to claim 1, wherein said high-frequency power amplifier for use with the bias control circuit is comprised of a transistor.

3. The bias control circuit according to claim 2,

wherein said high-frequency power amplifier is configured to have output power that varies in accordance with a base-emitter voltage applied to the transistor constituting the high-frequency power amplifier, and the bias control circuit optimally controls the bias current of the high-frequency power amplifier so that desired output power corresponding to the control voltage is output from the high-frequency power amplifier.

4. The bias control circuit according to claim 2, wherein said bias control circuit is comprised of a transistor integrated circuit and is formed into an integrated circuit together with the transistor constituting the high-frequency power amplifier.

5. The bias control circuit according to claim 4, wherein said bias control circuit is constituted by a transistor integrated circuit that is operable with a DC power source voltage of 1.5 or 3.0 volts.

6. The bias control circuit according to claim 5, wherein at least part of the transistor integrated circuit constituting the bias control circuit is comprised of transistors that are configured to have a maximum base-emitter voltage which is approximately half the DC power source voltage supplied from a battery.

7. The bias control circuit according to claim 6, wherein the at least part of the transistor integrated circuit constituting the bias control circuit is constituted by heterojunction-bipolar transistors whose maximum base-emitter voltage is approximately 1.4 volts.

8. The bias control circuit according to claim 6, wherein the at least part of the transistor integrated circuit constituting the bias control circuit is constituted by Si bipolar transistors whose maximum base-emitter voltage is about 0.7 volts.

9. The bias control circuit according to claim 1, further comprising a temperature compensation circuit for applying a temperature compensation voltage to the inverting input terminal of the two-stage differential amplifier.

10. The bias control circuit according to claim 9, wherein said temperature compensation circuit comprises:

a resistor bridge circuit including a diode-connected temperature-sensing transistor connected in series therewith;

an error amplifier, comprised of a pair of amplifying transistors, for amplifying a bridge output of the resistor bridge circuit to obtain an error voltage; and

an output transistor for effecting low-impedance conversion of an output voltage of the error amplifier, to thereby generate a temperature compensation voltage.

11. The bias control circuit according to claim 9, wherein said temperature compensation circuit and the voltage conversion circuit are each constituted by a transistor integrated circuit, and the temperature compensation circuit is formed into an integrated circuit together with the voltage conversion circuit.